

**WE CLAIM**

1. A seat spring assembly comprising:  
a frame having a first and a second frame end with first and second sides  
connected to the first and second frame ends;  
a plurality of flat leaf springs having leaf spring first ends connected to the first  
frame end and leaf spring second ends connected to the second frame end;  
0-1 V arch and/or 0-3 W arches with at least each leaf spring having one V or W  
arch adjacent the leaf spring first or second end;  
a cross piece, said cross piece being suspended between first and second frame  
sides, said leaf spring second ends being attached to said cross piece; and  
a plurality of coil springs, said coil springs connecting said cross piece to said  
second frame end.
2. The seat spring assembly of claim 1 wherein each leaf spring has
  - (a) no W arches and a V arch adjacent the leaf spring first end, and the leaf spring  
has a bowed portion between the V arch and the leaf spring second end; or
  - (b) no V arch and one W arch adjacent the leaf spring second end, and the leaf  
spring has a bowed portion between the W arch and the leaf spring first end; or
  - (c) a V arch adjacent the leaf spring first end and one W arch adjacent the leaf  
spring second end, and the leaf spring has a bowed portion between the V and W  
arches; or

(d) two W arches with one W arch adjacent the leaf spring first end and the other W arch adjacent the leaf spring second end, and the leaf spring has a bowed portion between the two W arches; or

(e) two W arches with one W arch adjacent the leaf spring second end and the other W arch between the one W arch and the leaf spring first end.

3. The seat spring assembly of claim 1 or 2 wherein there are 3-6 leaf springs for each seating position and a helper spring is attached to at least two of every 4 leaf springs, said helper spring being attached at one helper spring end between the first leaf spring end and the first frame end, and the helper spring other end extending below its respective leaf spring for a length less than the length of the leaf spring.

4. The seat spring assembly of claim 1, 2 or 3 wherein the W arches when present have radii that permit the leaf spring to flex to extend the leaf spring and to accommodate twisting of the leaf springs.

5. The seat spring assembly of anyone of claims 1- 4 wherein there are 4 leaf springs for each seating position and the first and second sides of the frame are formed with a dropped center position between front and rear downwardly depending segments for clearance.

6. The seat spring assembly of anyone of claims 1- 5 wherein the frame is a U-shaped frame having first and second sides and the first end and the second end crosses the opening on the U; the leaf springs are formed and arranged to have one W arch located proximate the frame first ends where the springs are joined to the cross piece, and/or a V or front W arch proximate the second leaf end; and a substantially flat, but slightly bowed, portion of each leaf spring extends between said V or W arch and the opposite end of said leaf spring or between the V and W arch or between the first end and front W arches.

7. The seat spring assembly of anyone of claims 1- 6 wherein a helper spring mounted in association with each of said leaf springs and said cross piece, said helper spring having a first leg sandwiched between the leaf spring and front member and an angled second leg that projects inwardly, in the same direction as the axis of the leaf spring, and downwardly, so that as leaf spring flexes, the helper spring provides additional support and spreads the load on the leaf spring over a broader area than the point of contact with cross member that would occur in the absence of helper spring; and adjacent rear downwardly depending mounting plates on each of said sides, said plates enabling mounting of the spring assembly to seat arms or for connection to mechanisms or seat backs.

8. The seat spring assembly of anyone of claims 1-7 wherein the coil springs are attached to each leaf spring end to provide a heavier duty spring unit.
9. The seat spring assembly of anyone of claims 1- 8 wherein each W arch is formed and arranged with five formed radii that can flex to provide extension and accommodate twisting of these flat springs which are sufficiently wide to best follow the contour of the seat cushion for maximum occupant seating comfort, and allow the flat spring material to flex without setting up fatigue stresses at the ends of the flat springs.
10. The seat spring assembly of anyone of claims 1- 9 wherein the coil springs are generally disposed at the end of each leaf springs and in the spaces between the leaf springs;
- helper springs are attached to each leaf spring between the first leaf spring end and the first frame end, and the helper springs extend below its respective leaf spring for a length less than the length of the leaf spring; and each leaf spring has a bowed portion.